



Original Article

# Serological profile of voluntary blood donors in a blood bank of tertiary health care centre- An institution-based study

Sanjay Kaushik<sup>1</sup>, Gaurav Raturi<sup>1</sup>, Rishabh Tomar<sup>1</sup>, Jyotsna Bhateja<sup>1</sup>, Aparna Bhardwaj<sup>1</sup>

<sup>1</sup>Department of Pathology, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India

## Keywords:

Hepatitis B virus; Hepatitis C virus; Human immunodeficiency virus; Replacement donors; Syphilis and malaria; Transfusion-transmitted infections; Voluntary donors;

## ABSTRACT

**Background:** Safe transfusion of blood facilities is an essential component of an efficient, excellent healthcare sector. Unsafe blood transfusions can be a cause of transfusion-transmitted infections and can be lethal. The present study was conducted to find out the seroprevalence of HBsAg, HCV, HIV, malarial parasites, and syphilis in voluntary blood donors in a tertiary care center.

**Materials and methods:** This prospective study was conducted at the blood bank of the Shri Mahant Indiresch Hospital, Dehradun. 16413 samples from all blood donations were screened for HBsAg, HCV, HIV 1 and 2, malaria, and syphilis. Samples were collected in vacutainers at the time of blood donation and screened for HIV 1 and 2, HBsAg, and HCV using the fourth-generation enzyme-linked immunosorbent assay technique. Syphilis was tested by Treponema antibodies using the VITROS Syphilis TPA Reagent Pack. Malaria was tested by pan malaria card, monoclonal anti-pan specific parasite lactate dehydrogenase antibody conjugated to colloidal gold, and another monoclonal anti-pan specific parasite lactate dehydrogenase antibody immobilized on a nitrocellulose strip in a thin line.

**Results:** Out of 16413 blood donors 342(2.1%) were found to be seropositive and 16071 (97.9%) were found to be seronegative. The total number of donors, who were found positive for HBsAg/Anti HCV was 1 (0.3%). Out of the seropositive cases, HBsAg, HCV, HIV, and Syphilis infections constituted 28.9%, 27.5, 14.6, and 28.7% cases respectively.

**Conclusions:** There is a need for the development and implementation of stringent donor selection and sensitive screening tests to reduce the risk of acquiring transfusion-transmitted illnesses.

## Correspondence:

Dr. Jyotsna Bhateja, MD

Assistant Professor, Department of Pathology

Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun, Uttarakhand, India

ORCID ID: 0009-0003-1408-9819

Email: khushi.bhateja.91@gmail.com

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## INTRODUCTION

Blood transfusion is a life-saving intervention in contemporary medicine since it is a well-established treatment in numerous types of medical and surgical procedures, but it also entails a significant risk of spreading many undesired, life-threatening transfusion-transmissible pathogens.<sup>1,2</sup> Safe transfusions were costly from both a human and economic standpoint, resulting in significant mortality and morbidity.<sup>3,4</sup> The most prevalent TTIs (Transfusion Transmitted Infections) include HIV, hepatitis B and C viruses, syphilis, and malaria. An appropriate donor screening methodology for donor selection, adequate donor

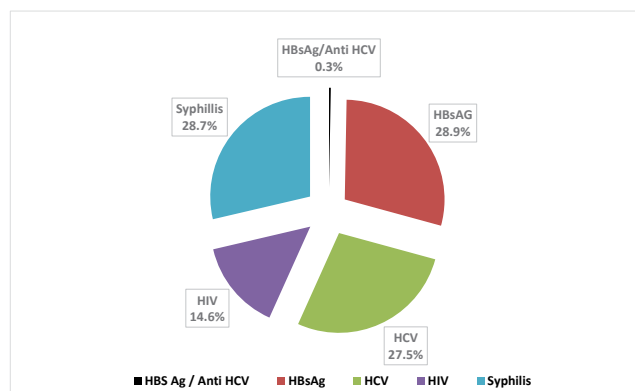
counseling, sensitive screening tests, and effective discarding strategies for reactive units can all help to reduce the chance of TTI acquisition. The present study was conducted to find out the seroprevalence of HBsAg, HCV, HIV, malarial parasites, and syphilis in voluntary blood donors.

## MATERIALS AND METHODS

This prospective study was conducted at the blood bank of the Shri Mahant Indires Hospital, Dehradun for 18 months from January 2021 to June 2022. The study was approved by the ethical committee. The filled donor forms which included the type of donation (voluntary/ replacement), the patient details, the pre-donation questionnaire, counseling details and medical examination findings available for each case were analyzed along with the TTI records. The samples from all blood donations were screened for HBsAg, HCV, HIV 1 and 2, malaria, and syphilis. Samples were collected in vacutainers at the time of blood donation and screened for HIV 1 and 2, HBsAg, and HCV using the fourth-generation enzyme-linked immunosorbent assay (ELISA) technique. HIV was tested using kits manufactured by VITROS HIV Combo Reagent Pack. Hepatitis viruses were tested using kits VITROS HBsAg Reagent Pack and HCV was also tested using kits manufactured by VITROS Anti HCV Reagent Pack. The sample analysis was conducted with the help of standard protocol given by in kit inserts manuals. Syphilis was tested by Treponema antibodies using the VITROS Syphilis TPA Reagent Pack. Malaria was tested by pan malaria card, monoclonal anti-pan specific pLDH (parasite Lactate Dehydrogenase) antibody conjugated to colloidal gold, and another monoclonal anti-pan specific pLDH antibody immobilized on a nitrocellulose strip in a thin line. All samples with reactive results were repeated in duplicate and triplicate before labeling them as reactive.

## RESULTS

A total of 16413 donations were collected during the study period of 18 months from January 2021 to June 2022. Out of 16413 blood donors, 2.1% were found to be seropositive and the rest of the donors were found to be seronegative. Out of 342 seropositive donors, 324 maximum number of donors were males. A major percentage (79.8%) of donors were voluntary while the rest were replacement donors (20.2%). The total number of donors, who were found positive for HBS Ag/Anti HCV was 1 (0.3%). The HBsAg, HCV, HIV, and Syphilis infections were found to be in 28.9%, 27.5%, 14.6% , and 28.7% of the positive donors, respectively ([fig. 1](#)). Malaria infection was not found to be prevalent in TTI during the study period.



*Figure 1: Distribution of cases according to seropositive status*

## DISCUSSION

The safe transfusion of blood facilities is an essential component of an efficient, excellent healthcare sector. However, tainted blood transfusions can be a cause of TTIs and can be lethal rather than beneficial.<sup>5,6</sup> The frequent occurrence of TTIs among blood donors in a well-organized healthcare organization with adequate blood bank services can be employed as a valid technique for estimating the prevalence of these infectious agents in the broader population. In our study, we evaluated all the blood donors that presented to the Blood Bank of SGRRIM and HS, Dehradun, Uttarakhand, India from January 2020 to June 2022. The objective was to find the seroprevalence of the Hepatitis B virus, Hepatitis C virus, Human Immunodeficiency Virus, Syphilis, and Malarial Parasite in a blood bank of a tertiary health care center.

In the current investigation, most of the 342 seropositive patients (40.1%; 137/342) belonged to the age range of 21-30 years, followed by the age group of 31-40 years (28.4%; 97/342). Similar findings were reported by Yadav BS et al<sup>7</sup> with 69.1% instances in the 18-30 years age group; Arora D et al<sup>8</sup> 66.9% cases in the 18-31 years age group and Sarah Y et al<sup>9</sup> 41.83% cases in the 20-29 years age group. In contrast to our findings, Prabhakar FP et al<sup>10</sup> found the greatest number of cases in the age range 26-35 years [37.56%].

It has been estimated that the worldwide incidence of HCV infection is roughly 2%, with 170 million people chronically infected and 3 to 4 million people being infected each year. HCV seroprevalence varies among hospital-based populations in India, with 1.57% reported from Cuttack (Orissa)<sup>11</sup>, 13 4.8% from Pondicherry<sup>12</sup>, and 1.7% from Jaipur (Rajasthan).<sup>13</sup> The seroprevalence of Hepatitis C infection in our sample was 29.3% (80/273).

The findings highlight the importance of enhancing screening facilities for blood and blood products before transfusion, adopting universal hepatitis B immunization, and raising public knowledge regarding the transmission and prevention of these illnesses in India. Continuous surveillance would give a better knowledge of these diseases in this geographical

region, as well as the impact of preventative actions on the vulnerable population.

Donor screening procedures in blood banks have received significant attention in recent years to ensure a safer blood supply. This is no screening approach that can eliminate the risk of TTIs. The existing pattern of transmissible diseases and trends in the donor population can aid in the planning of potential blood transfusion-related health concerns. Tight criteria for donor selection are required to minimize needless transfusions and to conduct periodical serosurveys, which are one of the key approaches for determining the prevalence of TTIs. Furthermore, using careful and extremely sensitive approaches for donor screening for TTI identification may lower the risk of TTIs even further. In addition, encouraging female blood donors as well as volunteer blood donors to donate blood could boost the total number of donors and the safe donor pool. Donor notification and counseling are required to avoid additional infection spread.

## CONCLUSIONS

Despite acknowledging that the incidence of HIV and HBV is on the decline, there is still a need for the development and implementation of stringent donor selection and sensitive screening tests that can reduce the risk of acquiring transfusion-transmitted illnesses, with a focus on infections caused by HCV.

Finally, this will aid in the implementation of better techniques for infection prevention to provide safe blood to patients.

**Conflict of Interest:** None

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